

NAME: \_\_\_\_\_

DATE: \_\_\_\_\_

**p1020: graded take-home open-note practice exam (version 213)****Question 1**

Let  $f$  represent a function. If  $f[4] = 26$ , then there exists a knowable solution to the equation below.

$$y = \frac{f\left[\frac{x}{2} - 10\right] - 5}{3}$$

Find the solution.

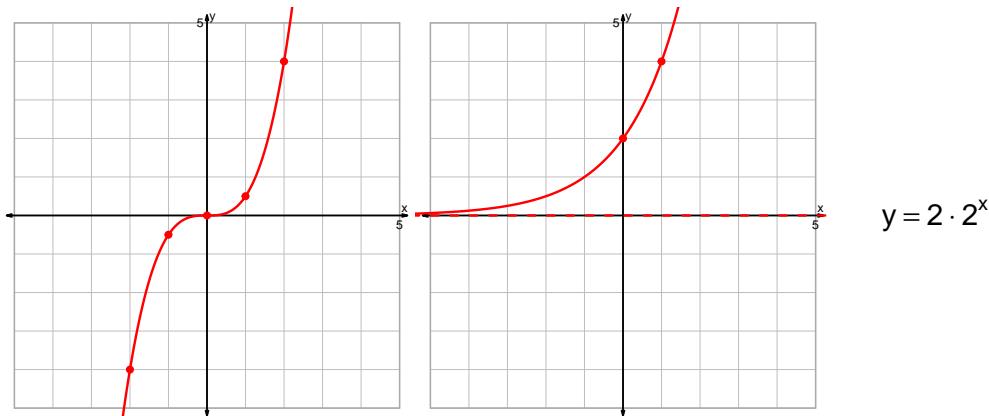
$$x = 28$$

$$y = 7$$

**Question 2**

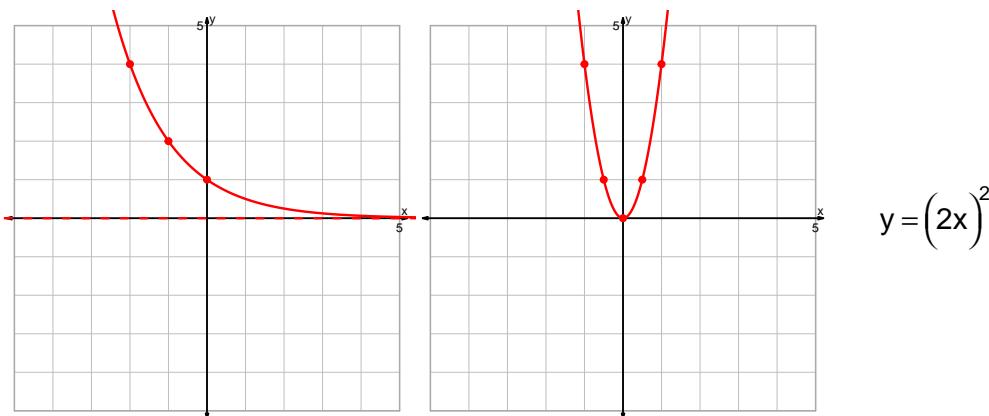
Graph the equations accurately. For each integer-integer point on the parent, indicate the corresponding point precisely. Also, with dashed lines, indicate any asymptotes.

$$y = \frac{x^3}{2}$$



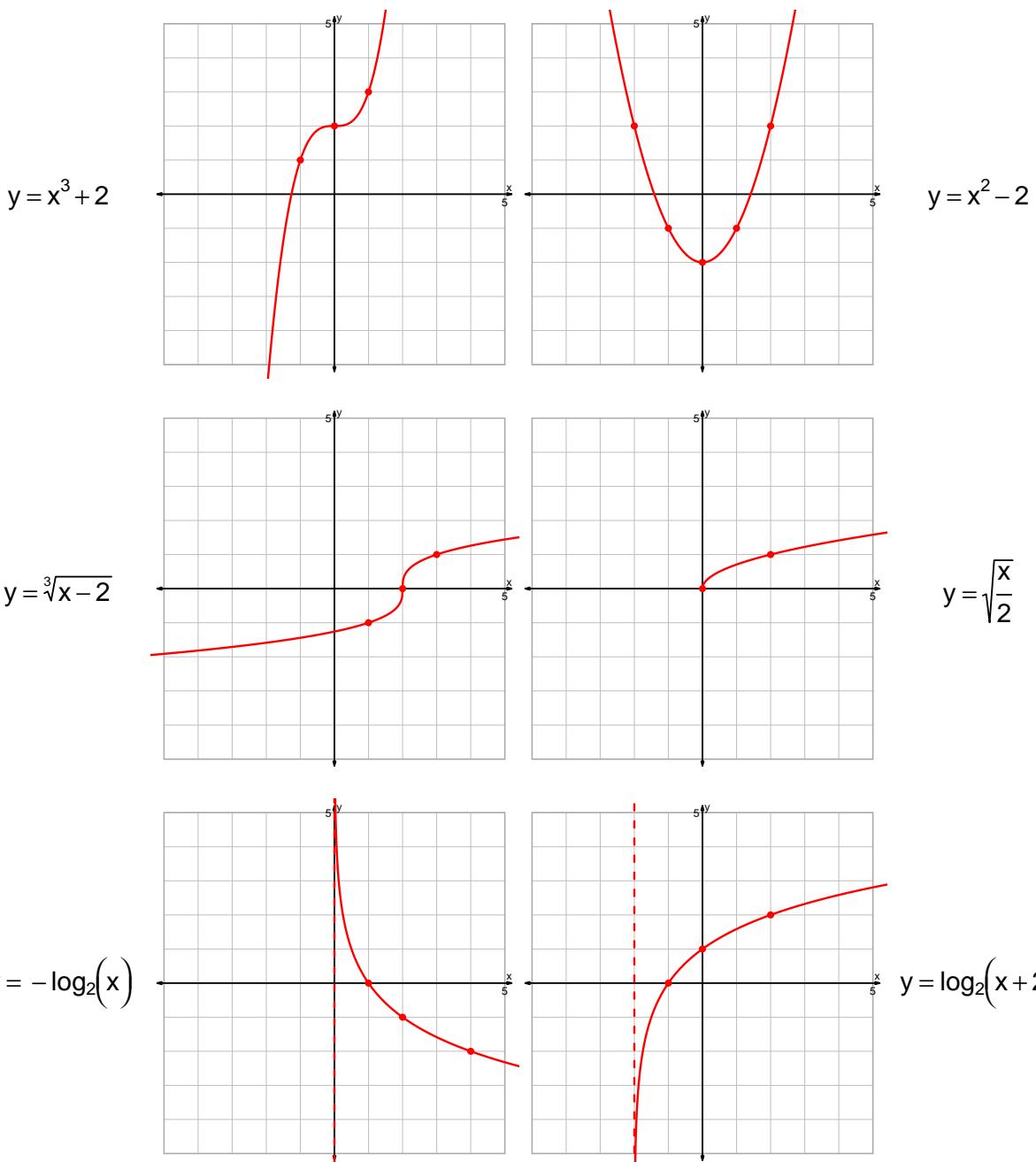
$$y = 2 \cdot 2^x$$

$$y = 2^{-x}$$



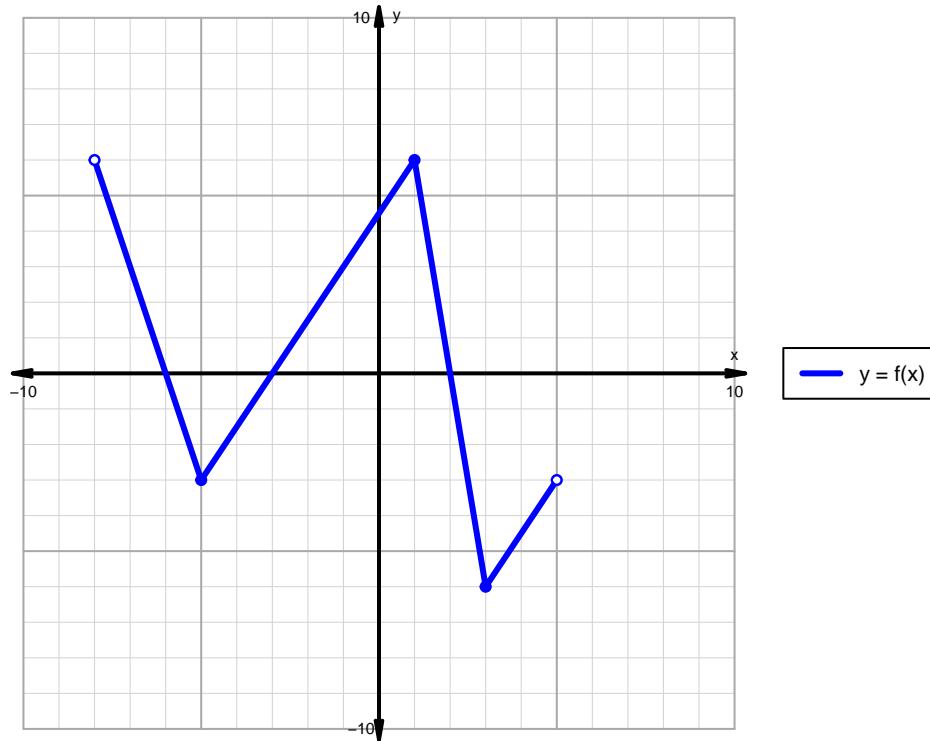
$$y = (2x)^2$$

Question 2 continued...



**Question 3**

A function is graphed below.



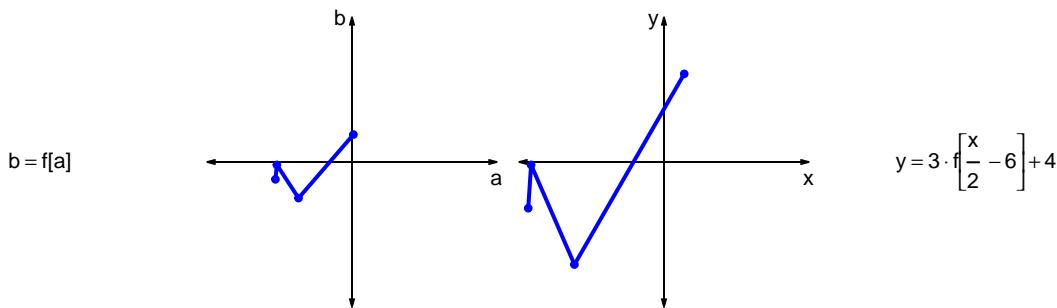
Indicate the following intervals using interval notation.

Feature	Where
Positive	$(-8, -6) \cup (-3, 2)$
Negative	$(-6, -3) \cup (2, 5)$
Increasing	$(-5, 1) \cup (3, 5)$
Decreasing	$(-8, -5) \cup (1, 3)$
Domain	$(-8, 5)$
Range	$(-6, 6)$

#### Question 4

Let  $f$  represent a function. The curves  $b = f[a]$  and  $y = 3 \cdot f\left[\frac{x}{2} - 6\right] + 4$  are represented below in a table and on graphs.

a	b	x	y
-53	-12	-94	-32
-52	-2	-92	-2
-37	-25	-62	-71
1	19	14	61



- a. Write formulas for calculating  $x$  from  $a$  and calculating  $y$  from  $b$ . (Or, write the coordinate transformation formula.)

$$x = 2(a + 6)$$

$$y = 3b + 4$$

Or, you can write the formulas as a coordinate transformation:

$$(a, b) \rightarrow (2(a + 6), 3b + 4)$$

- b. What geometric transformations (using words like translation, stretch, and shrink), and in what order, would transform the first curve  $y = f[x]$  into the second curve  $y = 3 \cdot f\left[\frac{x}{2} - 6\right] + 4$ ?
1. Translate right by distance 6.
  2. Horizontal stretch by factor 2.
  3. Vertical stretch by factor 3.
  4. Translate up by distance 4.

Or, technically, the vertical transformations could come first.

1. Vertical stretch by factor 3.
2. Translate up by distance 4.
3. Translate right by distance 6.
4. Horizontal stretch by factor 2.

### Question 5

A parent square-root function is transformed in the following ways:

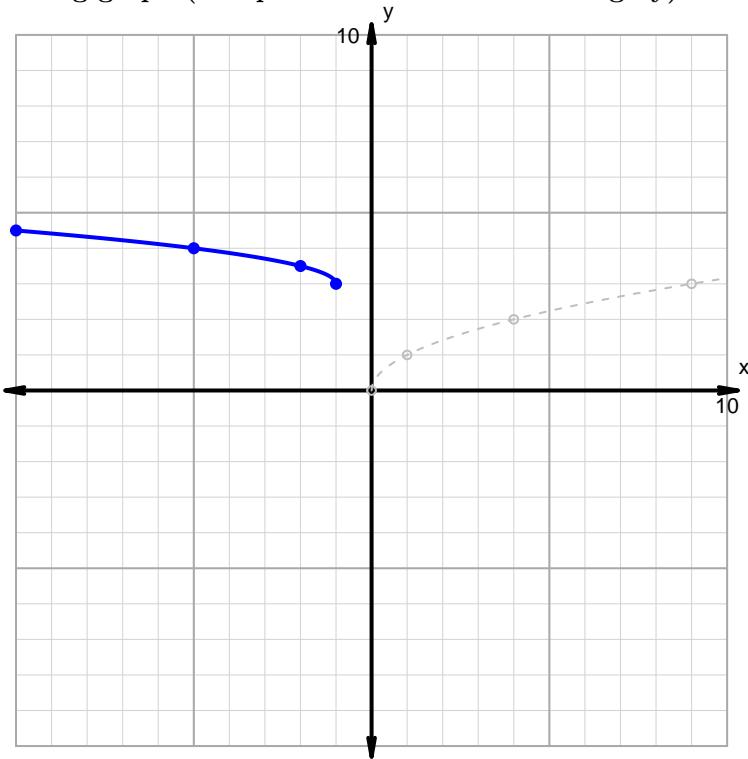
#### Horizontal transformations

1. Translate right by distance 1.
2. Horizontal reflection over  $y$  axis.

#### Vertical transformations

1. Vertical shrink by factor 2.
2. Translate up by distance 3.

Resulting graph (and parent function in dashed grey):



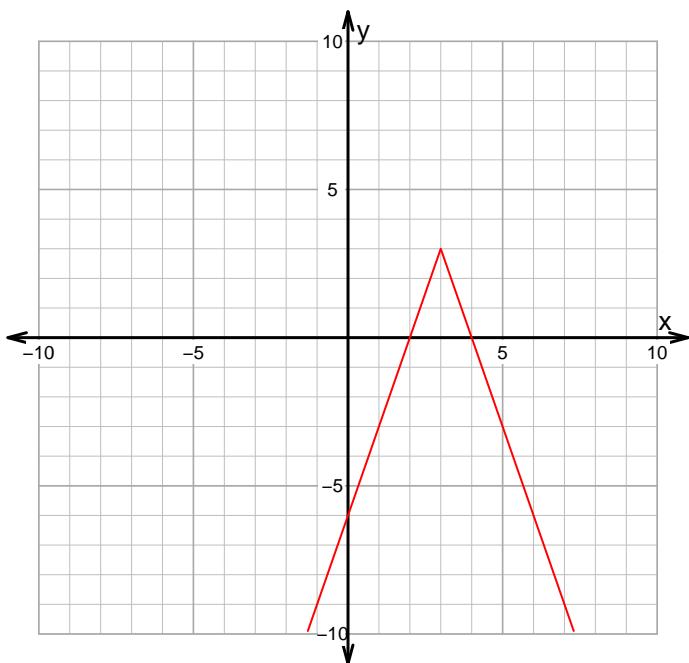
- What is the equation for the curve shown above?

$$y = \frac{\sqrt{-x-1}}{2} + 3$$

**Question 6**

Make an accurate graph, and describe locations of features.

$$y = -3 \cdot |x - 3| + 3$$



Feature	Where
Domain	$(-\infty, \infty)$
Range	$(-\infty, 3]$
Positive	$(2, 4)$
Negative	$(-\infty, 2) \cup (4, \infty)$
Increasing	$(-\infty, 3)$
Decreasing	$(3, \infty)$